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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/620,468 | 07/15/2003 | Dinesh Chopra | MI22-2345 | 8630 |
| 21567 | 7590 | 09/27/2006 | | |
| WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201 | | | EXAMINER TRAN, THANH Y | |
| | | | ART UNIT 2822 | PAPER NUMBER |

DATE MAILED: 09/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,468

Applicant(s)

DINESH CHOPRA

Examiner

Thanh Y. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 55-68, 79 and 80 is/are pending in the application.
- 4a) Of the above claim(s) 62-68 and 79 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 55-61 and 80 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/9/05 & 1/18/06
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Applicant's election without traverse of Species I (claims 55-61 and 80) in the reply filed on 7/19/06 is acknowledged.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 55-56 and 58-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al (U.S. 6,100,195) in view of Hem P. Takiar (UK 2184288).

As to claim 55, Chan et al discloses in Figs. 2D-2H a conductive connection forming method comprising: forming a first layer (56) comprising copper ("interconnect copper line") over a substrate (52) (see col. 4, lines 31-37), forming a second layer (61) comprising a second metal different from copper over the first layer, the second metal (61) comprising palladium (see col. 4, lines 43-49), incorporating at least some of the palladium into an intermetallic layer (comprising layer 61 and a portion of layer 56) comprising the palladium and copper (see col. 4, lines 49-55, layer 61 and a portion of layer 56 comprising palladium and copper), removing at least a portion of any second metal (61) (see figures 2F-2G) that is not incorporated into the intermetallic layer (comprising layer 61 and a portion of layer 56) and exposing the intermetallic layer (comprising layer 61 and a portion of layer 56) (see figure 2G), and forming a conductive connection (66, figure 2J) directly to the intermetallic layer (comprising layer 61 and a portion of layer 56) without a passivation layer therebetween.

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Chan et al does not teach the intermetallic layer (palladium-copper layer) having a thickness of from about 50 to about 150 Angstroms.

Hem P. Takiar teaches in figure 7, the layer having a thickness of from about 50 to about 150 Angstroms ("80-300 Angstroms") (see the ABSTRACT in Hem P. Takiar). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the conductive connection forming method of Chan et al by using the layer having a thickness of from about 50 to about 150 Angstroms ("80-300 Angstroms") as taught by Hem P. Takiar for providing a low diffusivity of palladium layer in a copper layer (see the ABSTRACT in Hem P. Takiar). Furthermore, even though Takiar does not explicitly disclose that the layer having a thickness of from about 50 to about 150 Angstroms. However, the thickness range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

As to claim 56, Chan et al discloses in Figs. 2D-2H a conductive connection forming method, wherein the intermetallic layer (comprising layer 61 and a portion of layer 56) consists of copper and palladium (see col. 4, lines 49-55, layer 61 and a portion of layer 56 comprising palladium and copper).

As to claim 58, Chan et al discloses in Figs. 2D-2H a conductive connection forming method, wherein the first layer (56) has an elevational thickness-before the incorporating, further comprising removing any second metal (61) not comprised by the intermetallic layer (comprising layer 61 and a portion of layer 56), and any portion of the intermetallic layer (comprising layer 61 and a portion of layer 56), beyond the elevational thickness.

As to claim 59, Chan et al discloses in Figs. 2D-2H a conductive connection forming method, wherein the removing comprises chemical mechanical polishing (see col. 3, line 65 – col. 4, line 8; and col. 4, lines 38-42).

As to claim 60, Chan et al discloses in Figs. 2D-2H a conductive connection forming method, wherein a rate of removing the second layer (61) compared to the intermetallic material (comprising layer 61 and a portion of layer 56) inherently comprises greater than 5 to 1 (it should be noted that: the rate of removing the second layer 61 compared to the intermetallic material (comprising layer 61 and a portion of layer 56) is inherently comprises greater than 5 to 1 because the materials of the second layer 61 and intermettallic layer in the reference of Chan et al are –made of the same material as that of the second layer and intermetallic layer of the present invention, thus they must inherently have the same rate (greater than 5 to 1).

As to claim 61, Chan et al discloses in Figs. 2D-2H a conductive connection forming method, wherein the second layer (61) consists of palladium (see col. 4, lines 56-60).

3. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al (U.S. 6,100,195) in view of Hem P. Takiar (UK 2184288) as applied to claim 55 above, and further in view of McTeer (U.S. 6,069,075).

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As to claim 57, Chan et al in view of Hem P. Takiar does not teach the incorporating comprises annealing the first and second layer at a temperature of greater than 400 to about 500 °C. McTeer (U.S. 6,069,075) teaches the process of annealing the layers at a temperature of greater than 400 to about 500°C ("440 to 480 degree C") (see col. 3, line 60 – col. 4, line 5).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of Chan et al in view of Hem P. Takiar by applying a temperature of greater than 400 to about 500 °C ("440 to 480 degree C") as taught by McTeer for reducing reflectance or forming a desired anti-reflective coating (see col. 3, line 60 – col. 4, line 5 in McTeer).

Contact Information

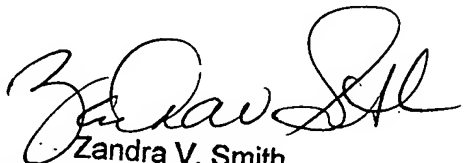
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Y. Tran whose telephone number is (571) 272-2110. The examiner can normally be reached on M-F (9-6:30pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TYT


Zandra V. Smith
Supervisory Patent Examiner
22 Sept. 2006